

**REMARKS**

The current application stands with claims 1-48 where claims 1, 17 and 40 are independent but where claims 10-11, 13-16, 26-27, 29-30 and 33-48 are withdrawn. Applicant herein amends claims 1, 5, 17, 20 and 40 for reasons explained below.

Applicant realizes that claim 40 is a withdrawn claim. Claim 40 has the same features as claim 1 plus other features. Thus, Applicant respectfully requests that the Examiner consider the amendment to claim 40 if and when claim 1 has been allowed.

**Specification and Claims Rejected under 35 U.S.C. § 112, First Paragraph.**

The specification stands objected to, and claims 1-9, 12, 17-25, 28 and 31-32 stand rejected, as failing to provide an adequate written description of the invention and an enabling disclosure under 35 U.S.C. §112, ¶1. The Examiner still asserts that the specification does not disclose the system configuration regarding target consistency and how it is mixed. The Examiner further explains "Claim 1 implies that the exposed material is distributed in a portion of the diffusing medium...the term "portion" implies that consistency throughout the diffusing medium of the exposed material is not uniform."

In response, it appears that the Examiner is asking how the material is physically positioned on the diffusing medium although this is not completely clear. In order to respond, the Examiner must first understand that the description for the activator block 16 for elected species of FIG. 7b is the same as that described for FIG. 7a. The specification recites:

**"The rest of the Activator Block 16 [on FIG. 7b] is in accordance with that of Figure 7a and with, e.g., the parameters of Table 6." Page 52, lines 34-36.**

In other words, the layer and region formation and description of the content of those regions (FIG. 7a and Table 6) is the description of those regions and contents for FIG. 7b. Once this is understood, then it can be understood how the species of FIG. 7b is fully described and enabled.

Now in response to the Examiner, claim 1 and the other independent claims have been amended to clarify what “portion” of the neutron-diffusing medium the “material” is distributed in. The claims now recite that the neutron-diffusing medium has an inner buffer region and that the material is distributed in a portion of the neutron diffusion medium that surrounds the inner buffer region. In one example, but not necessarily the only example, the inner buffer region is the first buffer layer 3 shown by FIG. 7a and the “portion” surrounding this inner buffer region is the activation region 4 shown by FIG. 7a.

In order to position the material at the claimed portion (e.g. the activation region 4), it is disclosed that the samples (e.g. Mo compounds) to be activated are embedded in the activation region 4 by putting them into thin tubes provided in the region 4 by using known tools such as pantograph tools (See page 53, line 1 et seq.). In this way, the specification describes how the “target consistency” or better labeled as the “location of the material on the neutron-diffusing medium” is achieved.

For these reasons, Applicant submits that the specification is fully enabling and complies with the written description requirement of 35 U.S.C. §112, ¶1, and respectfully requests that the objection to the specification and rejection of claims 1-9, 12, 17-25, 28 and 31-32 be withdrawn.

Claim 5 stands rejected under 35 U.S.C. §112, ¶1, for lacking an enabling disclosure for the claimed feature of two separate diffusing media. Specifically, the Examiner asserts that the specification does not disclose how the two separate diffusing media are maintained.

The Examiner stated that the arguments relating to FIG. 7a for this rejection can be ignored. As already pointed out above, this is entirely and completely incorrect. FIG. 7b, the elected species, clearly incorporates the design of the regions disclosed in FIG 7a. The Examiner must consider the referenced parts of FIG. 7a as part of the design of FIG. 7b as recited in the specification, repeated above.

Thus, Applicant amended claim 5 to clarify this structure and repeats the arguments from before that the specification is fully enabling for amended claim 5. There is only one diffusing medium with parts treated differently rather than separate diffusing media. Referring to FIG. 7a and claims 1 and 5, a diffusing medium has an inner buffer region 3 (made of lead only in the elected species) and a portion with the distributed material (activator portion 4 in FIG. 7a), and as recited in claim 5, may have another region (denoted by 5 in FIG. 7a) located beyond the activation portion 4 and before the carbon moderator 6. That "region" 5 is referred to as a "lead buffer" in the specification (page 54, first paragraph). In other words, portion 4 and region 5 are parts of diffusing medium 3 (also note that the portion 4 here is cylindrical – see page 56, table 6). Thus, the structure of claim 5 is fully supported by the drawings and specification.

The buffer layer or region 5 is free from the exposed materials because the thin tubes are not placed in the region 5. See FIG. 7a and corresponding description. Thus, for the reasons given here, Applicant respectfully requests that the 35 U.S.C. §112, ¶1 rejection of claim 5 for lack of enablement be withdrawn.

**Claim Rejections under 35 U.S.C. § 112, Second Paragraph.**

Claims 1-9, 12, 17-25, 28 and 31-32 stand rejected under 35 U.S.C. §112, ¶2 as being indefinite first because the Examiner asserts that the terms “so arranged that” recited in claims 1 and 17 merely suggest or make optional certain features, without limiting the scope of the claim (section 9.a of the Office Action). In response, Applicant deleted the language “so arranged that.” For these reasons, Applicant respectfully requests that the 35 U.S.C. §112, ¶2 rejection of claims 1 and 17 be withdrawn.

Second and third, claims 3-5 and 18-20 stand rejected due to the term “portion” or “region” recited in claims 3-5 and 18-20 as having no definition, no standard for ascertaining a requisite degree of the features and no indication of its scope. Again, the Examiner asserts that FIG. 7a is merely a non-elected species and cannot be relied upon. Applicant asserts again that this is incorrect as recited above and on the bottom of page 52 in the specification. Applicant nonetheless amended the claims to clarify the regions and portions. With this amendment, Applicant repeats the arguments from last Amendment B.

In response, as shown on FIG. 7a, it should now be clear that the claimed “portion” 4 and “region” 5 are two parts of the diffusing medium, one in which the exposed material is embedded, and the other which is devoid of exposed material. It is submitted that those terms define unambiguous structural limitations of the claims as disclosed by FIG. 7a and incorporated into FIG. 7b as recited on page 52. Thus, Applicant respectfully requests that the 35 U.S.C. §112, ¶2 rejection of claims 3-5 and 18-20 be withdrawn.

**Claim Rejections over Prior Art under 35 U.S.C. §102.**

Claims 1-9, 12, 17-20, 23-25 and 28 stand rejected under 35 U.S.C. 102(b) as being anticipated by Bowman (U.S. .5,160,696). In response, Applicant respectfully traverses because the cited reference does not disclose or suggest a diffusing medium substantially transparent to neutrons as recited in claims 1 and 17.

The Examiner appears to define the term “transparent” recited in the present claims to merely mean permitting neutrons to pass through the diffusing medium. The examiner asserts that any transmutation of the waste located within the container 98 results from neutrons which have traveled through the “diffusing medium” and interact with waste within the container. This is not the definition used by Applicants. MPEP 2173.05(a) (“When the specification states the meaning that a term in the claim is intended to have, the claim is examined using that meaning....” (citation omitted)).

Here the specification defines transparency as “the property of a medium in which neutrons undergo mostly elastic scattering. The succession of many, closely occurring elastic scattering events (generally about isotropic) gives a random walk nature to the neutron propagation. The flux is enhanced because of long resulting, tortuous random paths that neutrons follow before either being captured or exiting the large volume of the transparent medium.” Specification, page 2, line 30, to page 3, line 2. Thus, this definition for the field of nuclear waste is different than the simple dictionary definition of “transparent” that seems to be used by the Examiner. Applicant submits that the Examiner must use the definition of transparent from the specification.

Properly using the definition of transparent from the specification, it can be understood that BOWMAN's diffusing medium is not transparent to neutrons. Indeed, it contains abundant fertile and fissile materials which have a quite significant neutron capture cross section.

In BOWMAN's molten salt medium, inelastic processes are dominant over elastic scattering and therefore, the molten salt medium is not transparent according to the present definition of "transparent." BOWMAN proposes to transmute minor actinides and long-lived fission products like Tc-99 and I-129, through the use of an intense thermal neutron flux produced by an intense proton accelerator impinging on a Pb-Bi spallation target. The spallation neutrons are further multiplied in the molten salt blanket which is a mixture of LiF/BeF and minor actinides, i.e. highly non-transparent to neutrons, as is easily understood.

The intense thermal neutron flux, i.e.  $\sim 10^{16}$  n/cm<sup>2</sup>/s is necessary in order to overcome the low thermal neutron fission cross sections of minor actinides. BOWMAN relies on the double neutron capture process, in competition with decay, to achieve the required transmutation efficiency. Likewise, an intense thermal neutron flux is required to transmute long lived fission products like Tc-99 and I-129 which exhibits low thermal neutron capture cross sections. This explains why such products are distributed in a D<sub>2</sub>O blanket in order to thermalize efficiently and reduce the parasitic captures as opposed to H<sub>2</sub>O. Nowhere does BOWMAN mention the use of a transparent medium as defined herein nor the principle of transmutation based on adiabatic resonance crossing which is the technical effect provided by the claimed method steps.

Thus, because the inelastic processes in Bowman are quite dominant over elastic scattering when the neutron balance is considered, Bowman's blanket medium is not substantially transparent to neutrons as defined in the present invention.

Because no evidence exists in Bowman that its diffusion medium is substantially transparent to neutrons as defined herein, Applicant respectfully requests that the 35 U.S.C. §102(b) rejection based on Bowman of claims 1 and 17, and their dependent claims, be withdrawn.

**Claim Rejections under 35 U.S.C. §103.**

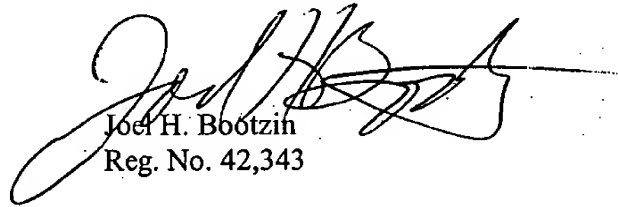
Claims 21-22 have been rejected as being “unpatentable” over Bowman in view of Borst, and claims 31-32 have been rejected as being “unpatentable” over Bowman and further in view of Ruddock (U.S. 4,123,497). In response, Applicant traverses because claims 21-22 and 31-32 directly or indirectly depend from claim 17, and therefore include all of the features of claim 17 plus other features. Thus, Applicant repeats the same argument mentioned above to overcome the §102(b) rejection of claim 17 and applies it here to overcome the present rejection. Specifically, all of the cited references: Bowman, Borst and Ruddock do not disclose or suggest a diffusing medium substantially transparent to neutrons. Thus, Applicant submits that the §103 rejection of claims 21-22 and 31-32 has also been overcome. For this reason, Applicant respectfully requests that the §103 rejection of claims 21-22 and 31-32 be withdrawn.

Independent Claim 40 and claims 41-48 which depend thereon have been withdrawn from consideration due to the election of species. Since claim 40 contains all the features of Claim 1 plus additional features, which is believed to be allowable, the allowance of claim 1 should result in the allowance of claims 40-48 as well. Consideration of claims 40-48 upon the allowance of claim 1 is respectfully requested.

For all of the reasons mentioned above, Applicant respectfully requests consideration and allowance of all pending claims. The Examiner should contact the undersigned attorney if an interview will expedite prosecution.

Respectfully submitted,

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